

GrummanWorld

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Our Employees Are Our Major Shareholders

May 12, 1989

The Lines Are Drawn For Battle Of FY '90

No new F-14D's, EA-6B's or A-6E's in defense budget submitted to Congress

It's going to be a long, hot summer.

On Tuesday, April 25, Defense Secretary Richard Cheney announced that funding had been cut for new F-14D's from the fiscal 1990 budget. In addition, there is no money for new EA-6B's or A-6E's.

"The budget has to be reviewed and approved by Congress, and that process could go on through the summer and into the fall," said Grumman Chairman John O'Brien. "We're determined to restore the funding. We have the full support of our congressional representatives."

Grumman isn't the only company that would be hurt by the proposed \$10 billion cuts in the defense budget in each of the next two years. The defense budget submitted to Congress proposes canceling or stretching out many big programs. For instance, Bell Helicopter Textron's V-22 Osprey program for the U.S. Marine Corps would be canceled, and production would stop on the McDonnell Douglas F-15E's and McDonnell Douglas-Hughes AH-64 Apache helicopters after the fiscal 1991 procurement.

Because the entire U.S. defense industry is affected, Grumman has decided not to concentrate its lobbying strategy on the defense budget's impact on the Long Island economy. "Congressmen across the country are wrestling with the threat of layoffs right in their own districts," says Grumman Aircraft Systems Division President Pete Oram. "Even though we are very concerned about the impact on our own people, we can't use that as ammunition when we go to

Capitol Hill. We've got to get down to the bare facts: what impact would the cancellation of any of these programs have on our nation's defense?"

Take, for instance, the F-14D. Grumman has been developing this new air superiority fighter for the U.S. Navy under a fixed-price, no-profit development contract since 1984. Grumman has signed two contracts with the Navy. The fiscal 1988 contract calls for seven F-14D's with deliveries beginning in March 1990; the fiscal 1989 contract is for another 12 with deliveries beginning in August 1990.

"The Tomcat is the Navy's premier defender of the fleet," said Oram. "The Navy has repeatedly said that it needs new F-14D's. Canceling production of new Tomcats would eventually result in serious inventory shortfalls, since the Naval Advanced Tactical Fighter (NATF) is not going to join the fleet until the turn of the century."

In addition, Grumman has been offering the Tomcat-21 as a more economical alternative to the NATF. Cancellation of the F-14D production would kill the Tomcat-21, says Oram.

The Navy plans to rework 400 F-14A's to the D configuration through fiscal year 1998. The upgrade includes installation of new engines, radar, digital avionics and structural improvements. The production run would reach a peak rate of 65 annually for the last two years. However, Oram cautions that such a plan must be approved by Congress. Plus, there is no guarantee that Grumman would do the upgrade. It might be

competitively bid; Grumman's prime competitor would be the Naval Air Rework Facilities.

"Grumman is proceeding cautiously, so it can launch a fortified campaign to reinstate our aircraft programs," says Oram. "It's very tempting to stand up and holler, 'Write to your congressman...Call your Senator...Flood Capitol Hill with telegrams.' But, we've got to remain cool, and follow a strategic plan of attack."

Here are some answers to questions many Grummanites are asking:

How many people would be laid off if the aircraft programs are not reinstated?

About 5,000 jobs would be affected on the F-14D program; 2,500 on A-6E program and another 2,900 on the EA-6B program. These figures include jobs that are charged directly to the programs and indirectly, such as in support areas.

The fiscal 1990 year begins October 1. If the funding is reinstated for the F-14D when would these aircraft be delivered to the Navy?

Beginning in June 1991.

Right now, where in Congress is the defense budget?

The proposed budget travels two paths in both the House and the Senate: authorization and appropriations.

The defense budget is now in the Armed Services Committees of both the House and Senate. These committees work on the defense appropriations bill. This bill lists which programs are to be funded. Right now, the proposed budget is undergoing a process called "mark-up," where committee

members are conducting a detailed analysis of the budget.

Meanwhile, the Appropriations Committees in both the House and Senate have given the proposed defense budget to their respective subcommittees on defense. These committees decide how much money will be given to each program.

After the appropriation and authorization defense bills have been approved by their respective committees, the House committee members meet with their Senate counterparts and iron out their differences.

This whole process should be completed by September 30. However, it has continued past that date in recent years.

Grumman Takes Action To Restore F-14

On Friday, May 5, Grumman announced the measures it has taken to get funding restored for the F-14.

- The company has organized a congressional action group which includes the entire Long Island delegation. Members of this committee will deliver information to specific congressmen and senators and discuss the issues with them.
- Grumman is distributing briefing books — one for every member of Congress in each of 49 states that has a constituency stake in the F-14.
- On Monday, May 15, the company will meet with the Long Island Association again. The LIA is the region's largest business lobbying group. Grumman will distribute briefing books and ask members to use their business and personal contacts in each of the districts important to Grumman.
- Plant managers in all off-sites are being asked to use their business contacts in support of this effort.
- All Grumman vendors are also being asked to help.
- If necessary, Grumman will ask employees, retirees and community leaders to help with a massive letter writing campaign.

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Grumman Reports First Quarter Results

On May 2, Grumman Corporation reported 1989 first quarter net income of \$16 million or 46 cents a share. In the first quarter of 1988, net income was \$21 million or 61 cents a share.

Sales for the quarter decreased slightly to \$905.4 million from \$908 million in the year-ago quarter. The company's backlog of \$7.8 billion was down slightly from last year's record level of \$7.9 billion.

Operating profits, before interest and taxes, were up approximately \$560,000 to \$50.9 million. Consolidated operating margins increased to 5.6 percent from 5.5 percent in last year's first quarter. Interest expense in 1989 increased by \$8 million to \$26.5 million due to higher rates and increased borrowings because of greater working capital requirements.

Sales in the aerospace segment increased by \$4.4 million to \$654.7 million while operating income increased by \$3 million to \$31 million. Operating margins increased to 4.7 percent from 4.3 percent in the year-ago period. Modification work on F-14 and A-6 programs increased in '89.

Electronics systems segment sales decreased 18 percent to \$114.5 million from \$139 million as a result of reduced test equipment deliveries and fewer electronics requirements for Grumman aircraft. Operating profits were \$2.4 million, down from \$2.6 million. Sales will begin in September 1990 from the \$58 million contract received March 30 for the Army's Integrated Family of Test

Equipment (IFTE).

The Joint STARS test aircraft continued successful test flights during the first quarter. Nevertheless, as previously reported, there is still a nine-month slip in the original program schedule, the effects of which continue to be assessed.

Special purpose vehicles segment sales increased 4 percent to \$103 million primarily as a result of price increases implemented after the first quarter of 1988. However, operating profit declined \$1 million to \$3.8 million. The continued strong performance on the Postal Service contract is being offset by start-up costs at the segment's centralized parts fabrication center and aluminum cost increases in the commercial truck body operation.

Information and other services segment sales increased slightly to \$134.4 million from \$133.9 million. Profit was \$13.3 million, down from \$14 million.

"Our operating income was up slightly for the quarter. However, as expected, the increased interest costs caused a \$5 million reduction in net income," said Chairman John O'Brien.

"Our backlog remains strong, including aircraft for delivery through 1991. But I am concerned about proposed cuts in the 1990 defense budget. We will be starting a prolonged political battle to ensure the future of the F-14 and A-6 programs that are vital to the defense of this country. I'm confident that when the budget is passed this fall, new aircraft for both programs will be funded."

Huebner To Retire June 30

Dan Huebner, Grumman vice chairman-development, will retire on June 30.

He joined Grumman in 1981 as senior vice president-marketing and advanced technology, in Grumman Aerospace. In 1986, he was made Grumman Corporation vice chairman of development, and elected a member of the board of directors. He will also retire from the board in June.

"My years with Grumman have been very rewarding," Huebner said. "It is a unique company with its diverse talents and unmatched employee loyalty. I certainly wish my fellow Grummanites the very best in the coming years."

His immediate plans include

spending more time with his family and enjoying some traveling.

Huebner began his career as a U.S. Air Force Ballistic Missile division project manager in 1958. In 1960, he joined General Electric as manager of Advanced Satellite Programs. Eventually, he became an executive in international business development, strategic planning and corporate development. He earned his undergraduate degree in aeronautics at the University of Minnesota, and two master's degrees, in aeronautics and aeronautical engineering, at the California Institute of Technology.

Chairman John O'Brien said, "Dan has made significant contributions to Grumman and all of us here will miss him. However, I have always known his priorities and I respect them."



Final Touches. At Grumman's Sherman, Texas, plant, James Stevenson applies a decal to a Kurbmaster aluminum truck. Grumman Olson recently sold 428 Kurmasters to Canada's post office, as well as a dozen LLVs.

Canada Post Orders Kurbmasters, LLVs

The Canada Post Corporation has ordered 428 Grumman Olson Kurbmaster walk-in delivery vans. In addition, the Canadians bought a dozen LLVs to try out in the suburbs of Vancouver, British Columbia.

The LLVs came right off the assembly line in Montgomery, Pennsylvania, where Grumman Allied is building LLVs for the U.S. Postal Service. The Kurbmasters were built in Olson's Sturgis, Michigan, plant.

"They bought them 'as is' except that we changed the paint scheme and the speedometers to read in kilometers," says Olson's regional sales manager John Fialka. Unlike the white U.S. LLVs, those bound for Canada have white roofs and bright red sides with blue stripes.

There could be a potential LLV market in Canada, says Fialka. "We'll know more after we get the

fuel consumption and user reports." Fuel consumption on the gasoline-fueled LLVs is critical because Canadians pay about \$2.20 a gallon for gas.

That's why the Canada Post always orders Olson Kurbmasters with General Motors diesels built in Canada. The diesels get far better mileage.

The Canada Postal Corporation buys 300 to 400 Kurbmasters a year from Olson and has about 3,000 Olson trucks in its fleet.

Under the new contract, the Canadians bought two sizes of Kurbmasters: 328 11-foot trucks and 100 14-footers.

"Grumman Olson has delivered a wide range aluminum trucks to the Canadian marketplace," Fialka says. "Because of Olson trucks' quality and their 20-year body life, Canadian truck buyers consider them the premier walk-in delivery vehicles."

Grumman and Rockwell Team For A-10 Navigational Gear

Grumman and Rockwell have formed a team to bid on development and integration of the NAVSTAR Global Positioning System (GPS) into the A-10 aircraft.

GPS is a space-based navigational system providing worldwide coverage, day or night, under all weather conditions. From an 11,000 mile orbit above earth, satellites relay extremely accurate altitude, latitude, longitude, speed and time data. These signals can be acquired by military users on land, air or sea.

Grumman was prime contractor for the integration of GPS equipment into A-6E, E-2C, EF-111A, and E-8A aircraft. Rockwell manufactures GPS user equipment and has extensive integration experience on other aircraft. It also designs cockpit management systems and NAVSTAR satellites.

LLV Crew \$hares In The \$avings

MONTGOMERY, Pennsylvania — When the paychecks were handed out here on April 13, each person took home an extra \$298.05.

Since the beginning of the year, the Long Life Vehicle crew here has slashed its rework, scrap, maintenance, and office-supply costs — so it is getting a share of the savings. A performance bonus plan was put into place in conjunction with the plant's first Grumman Quality project. The dollar gain associated with increased performance is split equally between the company and the people.

The 1989 first quarter amount is based on a savings of about \$330,000, divided in half, then by the number of people getting checks. There are 569 people at Montgomery; directors and officers do not share in the savings.

"Through the GQ process, we identified the problem: excessive rework caused by insufficient direction and communication among engineering, manufacturing, sales, and management," says Bill McLean, vice president of the LLV division of Grumman Allied. "The rework was costing us a bundle. Now, people see rework and scrap as

money coming out of their own pockets."

McLean's GQ action team included people from each unit of Grumman Allied — the team also analyzed rework in Boats, Emergency Products, and Olson. The bonus plan for the LLV unit ties in with the team's first solution.

The bonus is just one part of the program — communication is the other. The plant is divided into 42 work areas, each with a team leader. Every week, they all receive a half-dozen reports and charts depicting their performance to post on work area bulletin boards.

Such reports present each area's status in: efficiency, scheduling, scrap, safety, and quality. A short bulletin includes news about the plant and other areas of Grumman. Goals are set for the overall work force; work groups aim to exceed them.

"People see that their input really does make a difference," says Linda Eberlin, team leader in Body Subassemblies. "Our plant has cut scrap just about in half. We try to make use of material and damaged parts in ways we wouldn't have before."

"Of course, it was great having that extra money in our pockets,"

says Rich Hornberger, who works in subassemblies. "Was it necessary? It's hard to say...but it does seem to be working."

The LLV team is especially proud of reducing the work hours required to build each truck. At the end of 1987, that figure was 54 1/2 hours. Six months ago, it had dropped to 45 1/2 — but it included over four hours of rework. Now, the LLV crew takes 39 1/2 hours to build a truck, with less than two hours' rework on average. By year-end, the total is expected to be further reduced.

"I haven't heard of any people who were embarrassed to see their report up on display," says Bob Denien, president of LLV. "That indicates they are proud of their progress."

Denien points out that the system has built-in safeguards so that employees aren't penalized for circumstances beyond their control. For instance, while everybody is supposed to help reduce plant maintenance costs, snow removal expense is beyond everyone's control.

"And you can't just decide to eliminate something vital, such as preventive maintenance of a machine," says Denien. "But people can find better ways to do this work."

Concurrently, a significant change was made in the way rework is charged. Under the old system, people tended to pass problems along to the final assembly area because they weren't charged for it. They can't do that anymore. Through self inspection, required rework is performed and charged in the area causing the problem.

"We're also making team leaders more aware of the need for training on the line," says Denien. "When a new person starts, the team leader is held accountable for that employee's on-the-job training and performance."

Denien meets with production people often. Every two weeks, 10 people from the shop are chosen at random for a lunch meeting. And once a month, Denien sets up a mike and addresses the entire plant. Each quarter, he has a dinner meeting with the supervisors.

Besides helping to cut costs, all this has greatly improved morale at Montgomery, which was the scene of a union-organizing drive last May.

"I welcome questions — and ideas," says Denien. "In the course of researching the rework problem, the Montgomery GQ team members talked to quite a few people, asking for their ideas on the causes of rework. This is an

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GQ Saves Bucks. In Grumman's Montgomery, Pennsylvania, plant, Carol Lindauer and Donna Wertman build an LLV grille. The division recently instituted a performance bonus plan as part of its first GQ project.



Cost-Cutting Crew. David Houseknecht (above) unpacks a seat, while Betty Brown (R) builds skirt stiffeners on a press. Grummanites have slashed rework at the plant.



Navy Studies Process GQ

Undersecretary of Defense Robert Costello asked Capt. Wendell Brown, the head of the Naval Plant Representative Office (NAVPRO), to learn about Grumman's Process GQ. He wanted Capt. Brown to see if the 297 people of NAVPRO-Bethpage might improve the way business is conducted between Grumman and NAVPRO by using some of the techniques.

Capt. Brown and members of his staff went through a two-day warm-up session on March 21-22 given by Grumman facilitators Harlyn Van Sloten and Don Fechter of Business Operations. "We wanted to introduce them to the process, the language and the ways of thinking about quality," says Van Sloten.

Officers and civilian supervisors from several levels of NAVPRO's management were there. To make sure that rank didn't get in the way of candid give-and-take during the sessions, some ground rules were laid. Everyone was to wear civilian clothes and name tags with first names only.

For Capt. Brown, the two-day experience was the realization that GQ is a disciplined way to get the job done better, not some trendy new quality theory.

Capt. Brown says, "My reaction was that I didn't see anything new. What I did see were management methods recognizing that each person we deal with is a customer. It allows one to analyze how he's doing business."

"We are the local, government oversight activity at Grumman," says Bob Field, the NAVPRO Quality Assurance Division director. "It is important for the NAVPRO to understand GQ because it is beginning to affect the way we do business."

NAVPRO is now looking at several areas where it and Grumman interact to identify problems and whether joint quality action teams might be able to solve them.

"I can see a couple of areas," says Gary Gustafson, director of Management Support. "For instance, corporate correspondence

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Paper Recycling Program Reaches First Anniversary

Since the office paper recycling program began a year ago, Grummanites have recycled 100 tons of paper. Thousands of Grummanites in Bethpage, Long Island, are participating in the program, putting unwanted office paper into green folders for recycling. The folders are emptied each night.

The recycling program began in Headquarters and Buildings 30 and 35 in May 1988. Since then, the program has expanded to include most of the Bethpage complex. All Long Island facilities should join the recycling effort by the end of this year. The ultimate goal is to have Grumman sites across the country recycle their office paper.

"Recycling is not something that we're going to do for just a year or two. It is the way of the future," says Bart Cassidy, program coordinator. The office paper recycling program is only a part of the company's overall commitment to recycling. Metals, wood and cardboard have been recycled for years.

Most of the early glitches in the office paper recycling program have been ironed out. "Sometimes on the loading docks, people would throw a cardboard box or telephone book into the recycling firm's containers on the loading docks," says Cassidy. "They had good intentions. However, low grade papers cannot go into these containers. Although all paper types can be recycled, they aren't recycled by the same processes. And it's very important that we maintain a good quality load — strictly office paper."

As the program expanded from office buildings to production facilities, a new recycling bin was introduced. "Because some buildings have isolated office and shop areas, the folder concept doesn't always work," says Cassidy. These bins are identified by the green recycling labels describing what can and cannot go in them. They were designed with wide slitted lids so that coffee cups can't be thrown in by accident.

These bins are centrally located in office areas and on the shop floors. People in office areas can still receive green folders; when full, the folders are emptied into the bins.

Grumman's office paper recycling program was initiated prior to the approval of the Solid Waste Act by Governor Mario Cuomo last year. This law requires all communities in New York to begin a recycling program by 1992 — industry included. In addition, Long Island laws now mandate that all landfills must be

closed by 1990.

Based on the 100 tons of office paper saved this past year, Cassidy estimates that the annual savings in Bethpage alone should be about 600 tons once the program is going full throttle.

"As recycling programs across the country expand, increased responsibilities will be placed on businesses," he says. "We expect to see a lot more of that in the next couple of years; not only on Long Island, but in other states as well. The requirements across the country are tightening."

Florida passed a comprehensive Solid Waste Law last year, requiring certain percentages of recycling to be phased in over several years. A recent conference aimed at Florida's municipal representatives outlined the new legal requirements and stressed the need for cooperation with business.

"Getting people to think about recycling at work makes it easier for them to think about it at home," he says. "Additionally, businesses have tremendous amounts of solid waste, and they have the resources, organizational abilities and authority to accomplish recycling goals."

The Grumman program has been running so smoothly that other companies, such as Norden Systems and LILCO have inquired about its operation. The Town of Brookhaven and the Coalition to Save Hempstead Harbor have also requested information. Says Cassidy, "The word is out that Grumman is a company that's in the forefront of recycling."

Recycling Tips

What's recyclable? All bond paper, office stationery, copier paper, note paper, personal computer paper, and calculator tape. However, *no classified material can be placed in the green folders.*

Don't forget that paper clips, staples and rubber bands have to be removed before placing the paper in the folder.

Remember, certain types of paper can't be recycled in this program. These include: colored paper, newspapers, magazines, cardboard, coated paper, report covers, facsimile paper, carbon paper, envelopes, green computer printout paper, and paper fasteners.

For more information about the recycling program, contact the recycling coordinator in your department or Bart Cassidy at (516) 346-3071.



Customer Relations. Officials from NAVPRO-Bethpage attended a GQ warm-up session on March 21-22. They were introduced to the process, the language, and ways of thinking about quality. NAVPRO is now looking at areas where it and Grumman interact to identify problems and whether joint quality action teams may be able to solve them.

Navy Studies Process GQ

(Continued from page 3)

control: how does correspondence move between our mail rooms? Another is classified document control. Anywhere you see points where information is being exchanged between Grumman and NAVPRO, there may be more efficient ways of doing it.

"I liked a lot of the methods that Grumman's program uses to pull things together," says Gustafson. "With it you know all the action team members are putting the problems they face to the same test. They are all talking the same language."

"I don't think you can go through this kind of a process and not see some kind of improvement," he adds.

Brown calls the GQ process "a cultural revolution" that's due at Grumman. "I think one of Grumman's problems has been the difficulty in recognizing when the customer's needs have changed. It's been difficult sometimes to communicate these changed needs with Grumman," he says.

"GQ appears to be more than cosmetic," Brown adds. "The enthusiasm I see in managers who participated in this GQ process is very encouraging."

LLV Crew Shares The Savings

(Continued from page 3)
example of how you can get people involved in GQ who haven't actually gone through the formal training program."

In the northeast corner of the plant, the LLVs are inspected by the Defense Contract Administration Service (DCAS). This government agency oversees the contract for the Postal Service.

It can't inspect every single truck, so DCAS has a formula: it inspects three LLVs per lot of 25. If the three pass, DCAS buys the entire lot. The quality of Grumman's trucks has improved so dramatically, DCAS now inspects three LLVs per eight lots, or 200 vehicles.

"We get paid for our trucks when DCAS accepts them," says Denien. "So GQ has even helped Grumman financially."

Two more GQ teams recently were formed at Montgomery. One is working on a better engineering change control method. The other is looking to improve the plant's

"just-in-time" inventory system.

"We really began some of our productivity-improvement methods before GQ," says Denien. "But GQ provided a disciplined approach for analyzing problems and developing solutions. That really makes a difference. Everybody here is very excited about it."

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Looking Back On 26 Years

Alexandrovich Closes One Career, Tunes Up For Another

Alexander Alexandrovich plays balalaika in a six-piece band that's played towns from Dallas, to D.C., to Bridgeport. The band is a mix of unusual backgrounds: construction worker, librarian, retired liquor salesman, economist, teacher and, now, a former Grumman executive. On April 30, Alexandrovich retired as Space Systems Division president.

It's time to be with his wife, Jeanne, to do a little traveling, a little consulting and hit the

'Don't give up the real challenges,' he urges. 'They are the things that make people outstanding. The Lunar Module was a new challenge. Nobody had ever done it before and yet we did it, flawlessly.'

band circuit again.

He retired just short of his 26th anniversary with Grumman, ending a technical career he started 42 years ago, fresh out of North Carolina State with a B.S. in electrical engineering and a job with General Electric in Philadelphia. From Philly, GE sent him to Pittsfield, Massachusetts and then Schenectady, New York. There, at Union College, he earned his master's.

"I was happy at General Electric," he says of his 16 years there. "But I was on the Polaris program and that was winding down." He laughs and says, "My work week went from 72 hours to 60 hours. Suddenly, I had time on my hands."

So he joined Grumman in 1963. Comparing the two companies at that time, he remembers, "General Electric was a very structured company. Grumman had a

much looser approach. Though every now and then we had a little chaos, the advantage was that an individual who showed promise could move as far and as fast at Grumman as his skill would allow."

In his first Grumman job, he was assistant to the vice president of Engineering, Grant Hedrick. "He's a great guy, an engineer's engineer," Alexandrovich recalls. "Very bright, disciplined, thorough. He did not like sloppy work."

By 1970, Alexandrovich himself had become a vice president. He led several groups over the years, including advanced systems technology, training systems and, for six years, avionics and software.

For most of his Grumman years he worked on aircraft-related systems. But Alexandrovich feels that there really isn't too much difference between aircraft and space work. The same technologies that Grumman uses to develop radar, communication and display systems for planes are used for space vehicles. "I estimate that 80 percent of what we do in the aircraft world is transferable to space," Alexandrovich says. He proved his point in 1983 when, long after the end of the Lunar Module project and just as the space station was being planned, he was named vice president of space programs.

"I'm very proud of my last years here. We've come a long way in the space program," he says. "In 1979 and 1980, we didn't have much space work going."

But that changed with the shuttle wing work, the winning of the shuttle processing contract with Lockheed, the Space Station Program Support contract, space tug and the Boost Surveillance and Tracking System, among others. From it all, he has seen how reality has affected man's desire to explore space.

"One of the lessons we learned from the Challenger disaster is that we had tied all our assets to the Shuttle. In retrospect, that was not the right decision," he says. "Because of that tragedy, we learned we did not have assured access to space."

Alexandrovich believes that space can be the base for what he calls "the mission to planet Earth."

"The greenhouse effect, ozone holes, pollution — space can do a lot to help us understand these problems. Space can help us anticipate and counter crop failures and droughts," he says.

"The great observatories will be space observatories. The Hubble Telescope, which will go into space soon on the shuttle, will see 14 billion light years out. That's about how old the universe is. The telescope will see to the very edge of time," he says. Coupled with space travel, such observations "will show us how our universe was born, and that might very likely benefit us." Alexandrovich is

convinced that the space station "Freedom" — which constantly faces the blade of the budget cutters' knife — is necessary. "The space station would be the beginning of an infrastructure to colonize the moon and our starting point if we want to go to Mars. But I think that we should concentrate on a manned mission to the moon instead of Mars."

The reason is not just money. He says we've learned some lessons from the Russians' experiences with their own space station. "They indicate that we might not be ready to make the long trip to our nearest neighbor planet. There are physiological effects from long-term stays in space that we haven't learned to manage."

"Why not go to the moon, where we have been before and learned lessons?" he asks. "We've found Helium 3 on the surface of the moon. It could provide us with nuclear energy with a minimum of radiation problems. The potential is there."

Alexandrovich is also convinced that America cannot explore space on its own. "Space ventures are not cheap. The time has come for an international, cooperative scheme."

"The polls show that the American people believe space is a plus, but they don't know what they are supporting. We have to articulate our goals better."

On the military side of space, Grumman is pinning much on the Boost Surveillance and Tracking System (BSTS). Alexandrovich believes that, no matter which direction budget problems take the nation's Strategic Defense Initiative, the BSTS program will not be dropped.

"The country will want to have that surveillance capability," he says. "Not typical military intelligence, but just the observation of planes taking off, or missiles being launched."

An infrared-based system, BSTS will detect the launch of a missile by the heat from its

'The polls show that the American people believe space is a plus, but they don't know what they are supporting. We have to articulate our goals better.'

exhaust. While Grumman might not have an edge in price in this competition, Alexandrovich says it has one in design.

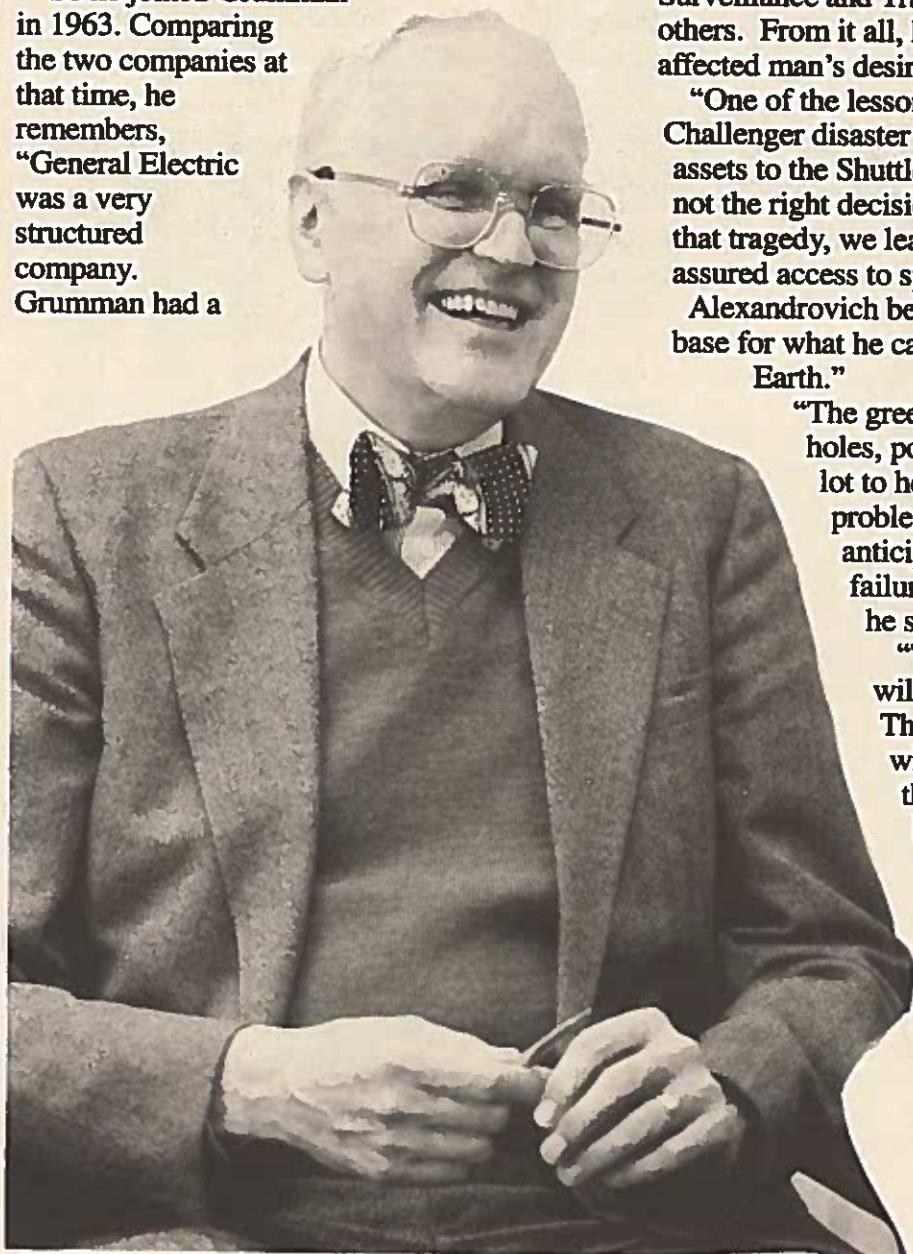
Lockheed, the competitor for the BSTS contract, has a design that sweeps its infrared vision back and forth across an area, losing sight of part of the area at any given time. Each Grumman BSTS satellite will stare continuously at its assigned area. "This means we can build up a lot more information over time. It gives us an orders-of-magnitude increase in sensitivity over the other guy. What we are doing is countering cost with a significant increase in performance," Alexandrovich says.

The Air Force should pick the contractor team that will build a BSTS satellite sometime around the middle of next year.

He also believes there is great promise for Grumman in the work being done by Space Systems Energy group. "There are both military and civilian applications for the work they are doing in fusion and neutral particle beams."

BSTS and fusion are a couple of those "big things" — the projects that inspire and test one's skills — that Alexandrovich urges Grummanites to keep striving for, no matter

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Nine Grummanites Awarded 1989 Master's Fellowships

Science and Engineering Master's Fellowships were awarded to nine Grummanites who work on Long Island. Thirty-five Grummanites had applied. Twenty applicants participated in the final competition.

Under the fellowship program, Grumman pays all costs for tuition, books and fees towards a master's degree. In addition, the winners get a \$1,200 tax-free stipend to cover time that they must take off from their jobs for studies. The nine will also work four six-month tours in different areas. These areas are matched as closely as possible to their interests and career goals.

The nine fellows are:

William Casey is a member of Electronics Systems Division's



Display/Trainer Products group in Bohemia. Casey earned his bachelor's degree in computer science from Hofstra

University. He plans to pursue a master's in computer science with emphasis on artificial intelligence and/or software engineering at Polytechnic University.

Kelly Fanto is a member of the Aircraft Systems Division's Systems Requirements group in



Bethpage. She earned her bachelor's in applied math from Hofstra University, where she has already earned 12 credit

hours toward her master's in computer science.

Marianne Fort works in Aircraft Systems' Advanced Airborne Early Warning program in Bethpage. She has a bachelor's



in electrical engineering from New York Institute of Technology. Fort intends to pursue her master's in electrical

engineering at Polytechnic University, concentrating on digital signal processing.

Patrick Honan works in Aircraft Systems' Optics and Displays group in Melville. He



has a bachelor's in electrical engineering from Manhattan College. Honan plans to pursue his master's in electrical

engineering at Polytechnic University, concentrating on electro-optics and circuit design.

Christopher Horan is a member of Aircraft System's Fluidics group in Bethpage. He



earned his bachelor's in mechanical engineering from Villanova. In 1983, he won a Grumman

Science and Engineering Scholarship. Horan intends to pursue his master's in mechanical engineering at SUNY Stony Brook, concentrating on dynamics and control systems.

Joseph Rana works in Aircraft Systems' Systems Integration



group in Bethpage. He has earned a bachelor's in electrical/computer engineering from Clarkson

University, and a bachelor's in business economics from SUNY Oneonta. Rana has already completed 15 credit hours toward his master's in electrical engineering at SUNY Stony Brook, concentrating on digital systems.

Steven Signorelli works in Aircraft Systems' Stability and Controls group in Melville. He



earned a bachelor's in aerospace engineering from University of Virginia, and a bachelor's in physics from

SUNY Oneonta. Signorelli has three credit hours toward his master's in mechanical engineering at Columbia University.

Joseph Su works in Aircraft Systems' Computer Architecture program in Bethpage. He earned



his bachelor's in electrical engineering from Polytechnic University, where he has already completed 21 credit hours

toward his master's in electrical engineering. He is studying signal processing and electro-optics.

Steve Tong works in Aircraft Systems' Computer Aided



Structural Analysis group in Bethpage. His bachelor's in civil engineering is from the University of Houston. He

plans to earn a master's in computer science at SUNY Stony Brook.



Studious Group. Grumman Data Systems Institute has announced its 1989 scholarships. Shown are: (L-R) Jerry Agostisi, director, Bohemia Campus; Sharon Ranzie, Sachem High School, Lake Ronkonkoma, L.I.; Institute President George Capua; Brian Court, St. Anthony's High School, Kings Park, L.I.; Christopher Augustine, William Floyd High School, Mastic, L.I. Not shown: Carl Avella, also of William Floyd High School.

Retiree Obituaries

Frank A. Anzillatto of 27 Landview Dr., Dix Hills, N.Y., died April 17, 1989. He retired in 1977.

David K. Arnott of 62 Elk Creek Rd., East Meredith, N.Y., died April 11, 1989. He retired in 1974.

Paul H. Babcock of Meadowbrook Rd., North Haven, Sag Harbor, N.Y., died April 15, 1989. He retired in 1983.

Gordon W. Barton of 108 Sims Rd., Auburndale, Florida, died April 1, 1989. He retired in 1982.

James A. Christiansen of 52 Perriwinkle Dr., Bohemia, N.Y., died April 18, 1989. He retired in 1977.

Joseph P. Corso of 198 Fredrick Ave., Babylon, N.Y., died April 16, 1989. He retired in 1980.

Richard J. Cyphers of 17 Kingsley Rd., Huntington, N.Y., died April 13, 1989. He retired in 1985.

Ray Fridinger of 8336 Belair Rd., Baltimore, Maryland, died March 22, 1989. He retired in 1969.

Frank Gengenbacher of 8 North Jackson St., Beverly Hills, Florida, died April 5, 1989. He retired in 1970.

Michael R. Granata of 650 East Strawbridge Ave., Melbourne, Florida, died March 7, 1989. He retired in 1966.

William L. Helmken of One Court St., Selden, N.Y., died March 15, 1989. He retired in 1962.

Frances B. Henry Jr. of 1502 E. 57th St., Savannah, Georgia, died April 11, 1989. He retired in 1986.

Edward N. Hoogland of 2639 Martin Ave., Bellmore, N.Y., died April 5, 1989. He retired in 1977.

Charles S. Kewicki of 212 9th St., Hicksville, N.Y., died April 8, 1989. He retired in 1971.

Peter P. Kusky at Rt. 2, Box 822Q10, Pompano Beach, Florida, died April 22. He retired in 1977.

Johnnie R. Martin of 704 N. Baker, Lot 23, Alma, Georgia, died April 16, 1989. He retired in 1978.

Joseph C. Monteleone of 76 Cedar Rd., Mastic Beach, N.Y., died March 18, 1989. He retired in 1975.

Robert W. Mullaly of 246 Pershing Parkway, Mineola, N.Y., died March 20, 1989. He retired in 1981.

Charles J. Niglio of 3398 NE Jeanette Ave., Jensen Beach, Florida, died March 25, 1989. He retired in 1986.

Anthony J. Parrella of 91 Nelson St., Farmingdale, N.Y., died April 1, 1989. He retired in 1988.

Einer L. Peterson of 190 Jervis Ave., Copiague, N.Y., died March 25, 1989. He retired in 1977.

Wilmer T. Pohley of 7 Melissa Dr., Beverly Hills, Florida, died March 20, 1989. He retired in 1973.

Harold J. Riss of 17 Muncy Rd., Bay Shore, N.Y., died March 28, 1989. He retired in 1977.

Anna Russo of 1880 Meadowbrook Rd., Merrick, N.Y., died March 2, 1989. She retired in 1984.

Benny Satcher of 623 Simmons Ave., Milledgeville, Georgia, died March 10, 1989. He retired in 1987.

Norman G. Saunders of 32 Bear Creek Path, Ormond Beach, Florida, died April 9, 1989. He retired in 1982.

Henry J. Schiebel Jr. at Box 102, Lakeville, Connecticut, died April 8, 1989. He retired in 1969.

John Zelano of 50 Roosevelt Ave., Syosset, N.Y., died April 11, 1989. He retired in 1957.

Alexandrovich Retires

(Continued from page 5)

how great the obstacles. "Don't give up the real challenges," he urges. "They are the things that make people outstanding. The Lunar Module was a new challenge. Nobody had ever done it before and yet we did it, flawlessly."

To the young engineer, he says, "Do not ignore the fundamentals. Getting practical shop experience and learning how a design is produced and produced with quality and low cost are important."

He adds: "I believe I was successful because smarter people worked for me. Find people to work for you who are smarter than you are. Don't be afraid of them."

"There was never a dull time here and I'm going to miss that," he says. "My early goal was to work my way to a key spot in the technical world. You take it one day at a time and, suddenly, you turn around and you're there."

"Over the last 10 years, I've had very little vacation. It's time to take some."

Debate Runs Hot And Cold Over Fusion In A Test Tube

Lately, you can't pick up a newspaper or magazine without reading about fusion energy.

It all started when in two separate experiments, three Utah scientists claim to have achieved nuclear fusion in an ordinary lab jar. The process is called "cold fusion," because it involves cold water as opposed to extremely hot gases. Scientists worldwide have rushed headlong into the race to duplicate their results, with mixed results.

More recently, James Fletcher left his post as NASA Administrator to work with University of Utah's newly created fusion energy lab.

Even the comedy series "Saturday Night Live" got into the act. It ran a mock demonstration

'In these days of big science, we would all like to see small science work.'

on its April 22 program — the props were a "Mousetrap" game and an Alka-Seltzer tablet.

The goal of nuclear fusion is to produce energy by uniting — fusing — light atoms such as isotopes of hydrogen. It could one day provide a limitless, clean source of power for the world. Fusion is the opposite of fission, atom-splitting, the technology at work in today's nuclear power plants.

The world's governments have spent millions on "hot" fusion, building giant reactors to explore fusion energy. Grumman has been working on such hot fusion research for over a decade, with about 30 Grumman scientists and engineers currently involved in such programs.

Progress has been slow, with most experts predicting such fusion reactors won't be commercially practical until well into the 21st Century. Now, the scientific community is awaiting better explanations about just what occurs in "cold fusion."

"Guarded but interested — that's essentially been our reaction to the cold fusion studies," says Alan Todd, who heads a group of Grummanites working on a support contract for the Princeton Plasma Physics Laboratory in New Jersey. Princeton has one of the world's largest fusion reactors, the Tokamak Fusion Test Reactor.

"In these days of big science, we all would like to see small science work," says Todd. "That is, it would be great if somebody can still make a scientific breakthrough in their basement."

Most of today's fusion test reactors are tokamaks, big, ring-

shaped structures called by a Russian word that describes their internal magnetics. Inside a vacuum vessel, gaseous hydrogen isotopes are heated to 100 million degrees Celsius. The vessel is surrounded by a series of powerful magnets that keep this mixture of gases, called plasma, from burning a hole in the walls. In this super-hot environment, the deuterium and tritium fuse, releasing energy.

By contrast, in "cold fusion," scientists claim to be able to achieve nuclear fusion in an ordinary lab jar. There were actually two announcements that sparked the current debate: an experiment conducted by electrochemists B. Stanley Pons and Martin Fleischmann of the University of Utah, and another by Steven Earl Jones, a physicist at Brigham Young University.

Both experiments used a similar apparatus: a small glass jar containing heavy water — consisting of deuterium oxide. Into it were immersed palladium and platinum electrodes, which were hooked up to a battery.

This process, known as electrolysis, frees deuterium atoms in the water. Pons and Fleischmann, however, claim the palladium electrode absorbed these free atoms, causing them to fuse to form helium and releasing large amounts of energy. However, their neutron measurements are not complete enough to document their findings, and other scientists have argued the results could be a poorly understood chemical reaction.

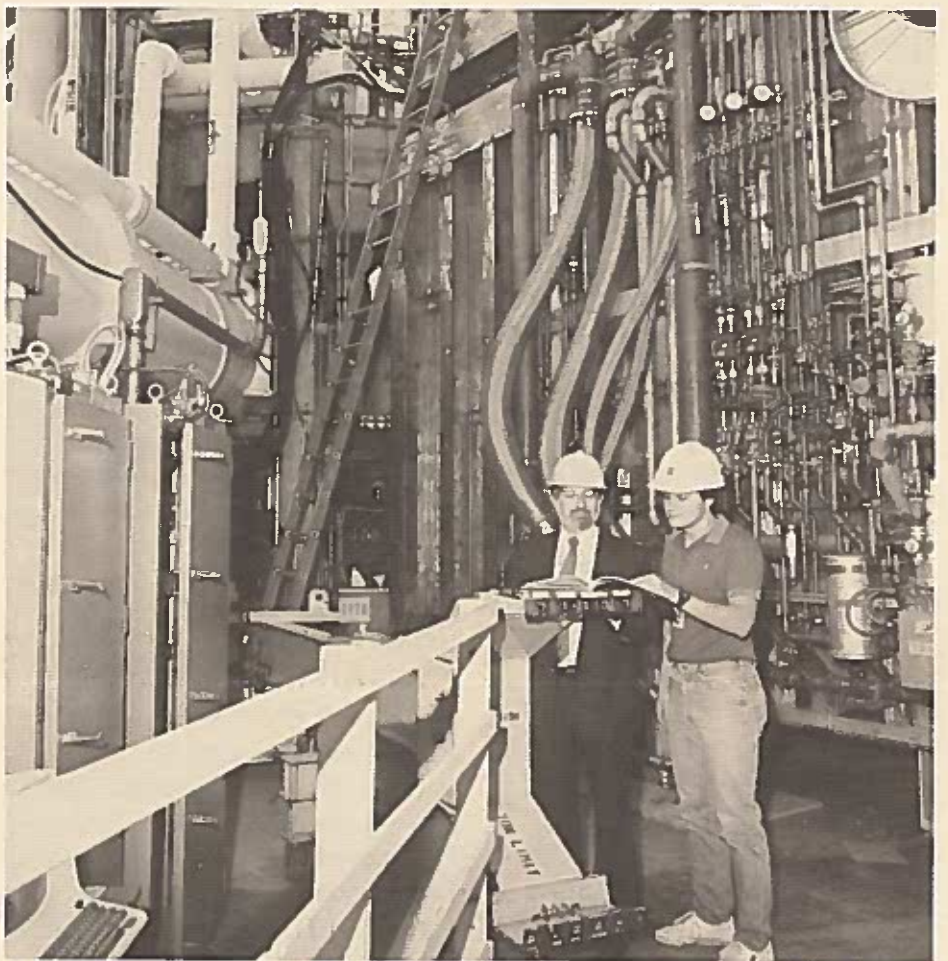
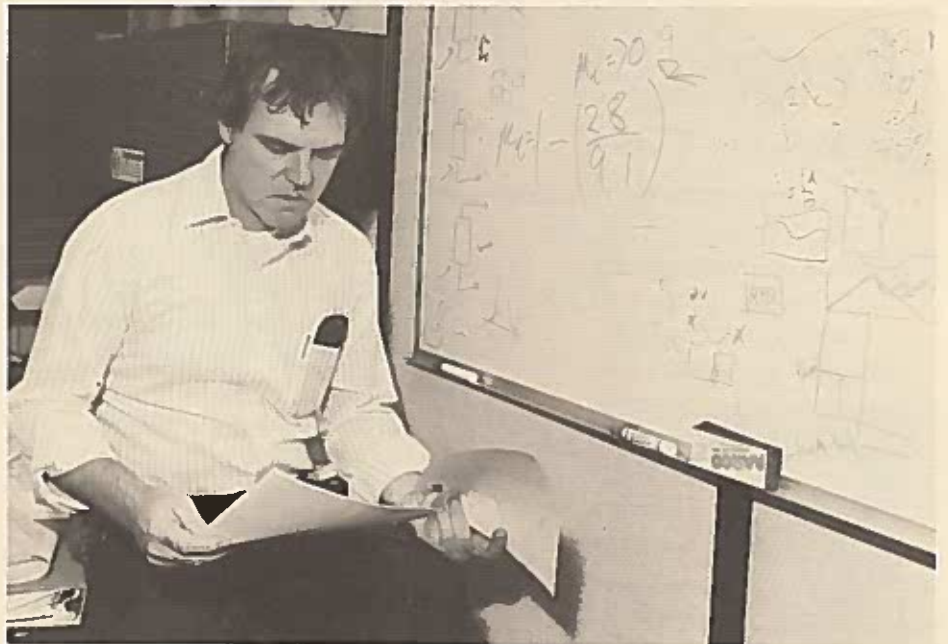
Jones, Pons and Fleischmann originally planned to co-publish their results. Jones' work is viewed with considerably less skepticism by the scientific

'There could be another explanation for what happened, such as a chemical reaction.'

community, perhaps because his claims are more modest. He reported measuring a small flow of neutrons, but not much energy.

"Pons' and Fleischmann's experiments are fairly incomplete by scientific standards," says Grumman physicist Michael Phillips. "In reading their papers, there were initial indications that fusion occurred, but they did no control experiments." In science, control experiments determine the extent of error in observations or measurements.

"From a physics standpoint, their claims are improbable," says Phillips. "They claim to have



Energetic Research. In Princeton, New Jersey, Grummanite Carl Paulson (above) studies some physics equations, while Stan Mendelsohn and Ira Lehrmann (below) look over data on the Tokamak Fusion Test Reactor. Grumman is a support contractor on this program, and the team in Princeton is carefully following the current debate over "cold fusion." (Photos by Bob Settles)

created so much heat that, in one case, the lab apparatus exploded. But their neutron count is small for such a large amount of heat. There could be another explanation of what happened, such as a chemical reaction."

"My feeling, and that of a lot of my colleagues at Princeton, is that Jones' experiment is plausible," says Ira Lehrmann, another physicist on the Tokamak team. "It is possible that a small amount of fusion occurred, but it doesn't look as if it could run a power plant. Jones himself said he can't speculate on whether it would ever be a source of power. But just achieving fusion in a solid would be a remarkable feat if verified."

Lehrmann points out that Jones' experiment generated one-trillionth of a watt — impossible to measure as heat. Measuring the number of neutrons freed in the process can be done, but it's difficult — especially in small quantities.

In his experiment, Jones documented 200 free neutrons per hour. By contrast, measurements at the Princeton's Tokamak Fusion Test Reactor have recorded as many as 10 to the sixteenth power fusion reactions per second.

"You can't measure neutrons directly. Instead, neutrons hit something when they are released, causing a flash of light called scintillation, which is what gets measured," explains Lehrmann. That difficulty has hindered the scientists who have attempted to conduct cold-fusion experiments of their own.

Lehrmann is highly critical of Pons and Fleischmann, suspecting that they did not spend enough time analyzing their experimental results.

"The people from *Nature* magazine, which reviewed their experiment, are reputed to have felt the same way," says Lehrmann. "Pons' response was to

(Continued on page 8)

People

Laurels For Luceri

Lou Luceri recently received a leadership award from the Institute of Electrical and Electronics Engineers (IEEE).

Luceri is a technical specialist in Electronics



Systems Division's Test Equipment Products Department. This award acknowledges his outstanding

leadership efforts during his career in advancing the professional aims of IEEE.

Luceri is IEEE's area chairman for Metropolitan New York. His contributions to IEEE include development of awards and training programs and serving as the IEEE's 1989 convention director.

Honorary Fellow

Grant Hedrick, retired Grumman senior vice president, was recently named an honorary fellow of the American

Institute of Aeronautics and Astronautics (AIAA)—its highest honor.

Hedrick's career at Grumman spans 45 years. He was involved with programs ranging from the



A-6, F-14 and E-2, to the Lunar Module, and the Space Station Program Support Contract.

Hedrick has received international recognition for his innovative contributions in the field of structural analysis and design. He was instrumental in Grumman's entry into the fusion program. Following his retirement in 1980, he became a senior management consultant

Appointments

Aircraft Systems

Integrated Logistics Support: Stanley Ramsden, program manager, S-2T Program.

Technical Operations: Edward F. Sweeney, program engineering manager, A-6.

Aerostructures: Harold C. Pabst, director, S-2T Program.

Material Operations: Andrew N. Ballow, deputy director, Material Operations and acting director of Administration; Nathan A. Anello, director, Material Control; Lawrence J. Burke Jr., director, Material Distribution; Thomas A. Capozzoli, assistant to director, Material Operations, for Special Assignments.

Data Systems

Program Management: Robert E. Smith, director, Program Development for San Diego Operations.

Electronics Systems

Corporate Procurement: John A. Harof, director, Procurement, Great River Operations.

Cold Fusion Ignites Debate

(Continued from page 7)

pull the paper. When I submit a paper for publication, and it comes back with all sorts of questions and criticisms, I go back to my lab and attempt to answer them.

"All this has really raised the public's awareness of the fusion energy program," he says. "Unfortunately, if the results prove to be erroneous, I think the Pons/Fleischmann experiment could hurt our credibility — and that of science in general."

In Bethpage's Building 26, Corporate Research Center senior staff scientist Al Tobin echoes the sentiments of his colleagues in Princeton. A lot more work must be done, he says, by Pons and Fleischmann before the scientific community is convinced nuclear fusion indeed took place in their laboratory.

"These men would get an instant Nobel Prize if indeed their work proves true," he says. "But other scientists ought to be able to go into a lab, use the same recipe, and get the same results. That isn't happening, which leads me to believe their experiments have been poorly controlled."

"It looks as if the skeptics are getting the upper hand," he adds. "Brookhaven, MIT, CalTech, and some foreign laboratories have all discounted the experiments. It wouldn't be the first time that so-called scientific breakthroughs have proved false."

The cold fusion debate has provided evidence of the far reach of a much less esoteric piece of technology: the facsimile machine. Within days of his announced findings, thousands of scientists across the nation, Grummanites included, had obtained faxed copies of the Pons/Fleischmann and Jones treatises.

In the meantime, the Grumman team in Princeton began 1989 working on two new fusion contracts. The first involves engineering support for the Compact Ignition Tokamak, which will be the Princeton Lab's next fusion test reactor and is now on the drawing boards. The second contract also involves providing engineering and physics talent to support the lab's overall operation.

The lab's projects have been stymied by lack of funding from the government which forced the university into a major layoff. Furthermore, the oil glut of the '80s has reduced public awareness of and support for alternative energy sources such as fusion.

At presstime, a different group of minds was airing the cold-fusion question: Congress. The Department of Energy has provided some small amounts of research funding, and based on the outcome of Congressional hearings, may want to commit

more dollars. At the same time, cold fusion doesn't necessarily spell the end of hot fusion and Tokamaks.

"A lot more demonstration has to be done," says Todd. "I'm certainly not going to stand up and say, 'it's all bull,' as some fusion experts have done. There's definitely something there — but maybe not of the same magnitude as claimed."

"The scientific community and the government are still a long way off from deciding the merits of cold fusion," concludes Todd.

Lecture Set For May 23

Artificial neural networks will be the topic of the next Leroy Grumman lecture, scheduled for Tuesday, May 23, 4:30 p.m., in the Headquarters auditorium.

The guest speaker will be Dr. John Hopfield, professor of chemistry and biology at California Institute of Technology.

Today's digital computers are inefficient at some tasks that are easily performed by the brain — such as pattern recognition. Artificial neural networks can perform some of the qualitative functions responsible for the brain's effectiveness.

Computation, algorithms and hardware for such networks will be discussed. Contact Mary Mickol at (516) 575-3766 or 8770 to reserve a seat.

Obituaries

Elmer M. Bauer of Dynamics, Melville, Aircraft Systems, died April 18 at the age of 63. He had been with the company since 1950 and resided at 12 Marirod Ct., Fort Salonga, N.Y.

Gerald Gelfand of Integration Verification and Validation, Bethpage, Aircraft Systems, died April 16 at the age of 60. He had been with the company since 1964 and resided at 14 Gates Ave., Plainview, N.Y.

Patricia J. Hunter of Electronic Subassembly, Stuart, Aircraft Systems, died April 20 at the age of 55. She had been with the company since 1973 and resided at 315 Erie Dr., Jupiter, Fla.

Roy V. Nystrom of Support Equipment Production, Bethpage, Aircraft Systems, died April 23 at the age of 61. He had been with the company since 1966 and resided at 10 Candy La., Huntington, N.Y.

Ralph Wagner Jr. of Radar, Melville, Aircraft Systems Division, died April 2 at the age of 61. He had been with the company since 1984 and resided at 12 Susan La., Dix Hills, N.Y.

Readership Survey

We don't want to do all the talking. We'd like to know what you think about the things you see in these pages. Your comments, suggestions, and complaints are welcome.

Article	Great	Good	Poor	Didn't Read
F-14D (p. 1)	[]	[]	[]	[]
Quarterly Results (p. 2)	[]	[]	[]	[]
GQ At LLV (pp. 3-4)	[]	[]	[]	[]
Navy Studies GQ (pp. 3-4)	[]	[]	[]	[]
Alexandrovich Interview (p. 5)	[]	[]	[]	[]
Fusion (p. 7)	[]	[]	[]	[]

Suggestions for future articles:.....

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